Family size, sex composition and children's education: Ethnic differentials over development in Peninsular Malaysia

By: Sudha Shreeniwas

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Abstract:

It is widely accepted that high fertility and the associated factors of large family size and short spacing between offspring are detrimental not only to development but also to the well-being of individual children, particularly in developing regions. Most evidence for such views comes from studies of the impact of sibship size and birth-spacing on infant morbidity and mortality (Trussel and Pebley 1984; Preston 1985; Pebley and Millman 1986; Bongaarts 1987, 1988). Scholars are increasingly examining the impact of large family size on other indicators of children's well-being, notably their educational attainment, expecting to find a similar negative association (for example, Knodel, Havanon and Sittitrai, 1990; Knodel and Wongsith 1991). This expectation is also reinforced by sociological and economic theories formulated in more developed contexts. These theories point to within-family resource allocation processes, such as deliberate parental 'trade-offs' between number and quality of children or inadvertent 'dilution' of educational resources among offspring, to explain the negative relationship between sibship size and schooling observed in industrialized settings (Becker and Lewis 1974; Becker and Tomes 1976; Sewell and Hauser 1977; Blake 1981; Blake 1989).

Keywords: family size | education | Malaysia | fertility | ethnicity

Article:

1. INTRODUCTION

It is widely accepted that high fertility and the associated factors of large family size and short spacing between offspring are detrimental not only to development but also to the well-being of individual children, particularly in developing regions. Most evidence for such views comes from studies of the impact of sibship size and birth-spacing on infant morbidity and mortality (Trussel and Pebley 1984; Preston 1985; Pebley and Millman 1986; Bongaarts 1987, 1988).

Scholars are increasingly examining the impact of large family size on other indicators of children's well-being, notably their educational attainment, expecting to find a similar negative association (for example, Knodel, Havanon and Sittitrai, 1990; Knodel and Wongsith 1991). This expectation is also reinforced by sociological and economic theories formulated in more developed contexts. These theories point to within-family resource allocation processes, such as deliberate parental 'trade-offs' between number and quality of children or inadvertent 'dilution' of educational resources among offspring, to explain the negative relationship between sibship size and schooling observed in industrialized settings (Becker and Lewis 1974; Becker and Tomes 1976; Sewell and Hauser 1977; Blake 1981; Blake 1989).

However, emerging evidence indicates that a negative impact of high fertility on children's education is neither universal nor inevitable. In different developing regions, large family size is sometimes detrimental (Knodel, Havanon and Sittitrai 1990; Knodel and Wongsith 1990), often has no impact (Arnold 1976; Clark 1979; Mock and Leslie 1984), or occasionally has even a positive effect (Chernochovsky 1984; Gomes 1984), on children's education. Attempts are emerging to reconcile such diverse findings within a unified conceptual framework. These attempts are critical of the earlier literature's exclusive focus on intrafamilial resource distribution processes to predict and explain relationships between family size and child well-being, arguing that attention must also be paid to conditions and institutions external to the family, which influence within-family resource availability and distribution affecting education or any other outcome (Shreeniwas 1992; Desai 1995).

To illustrate such arguments empirically, this study examines the family size-education relationship against the backdrop of developmental change in Peninsular Malaysia, highlighting the changing nature of the relationship in two different eras, each with distinctive socio-economic conditions and education policies. The study contrasts the relationships among two generations of children belonging to three ethnic groups, to enquire whether: (a) under different extra-familial development and policy contexts children from larger families are indeed educationally disadvantaged compared to those from small ones; and (b) some children within a family are at greater risk than others from any educational disadvantages arising from large sibship size. By examining changes within one country, this study complements approaches which investigate such issues through cross-national comparisons.

2A. FAMILY SIZE AND EDUCATIONAL ATTAINMENT OVER THE COURSE OF DEVELOPMENT

Previous studies, though carried out in various countries using differing methods, show evidence that the family size- schooling relationship is in fact conditioned by the developmental context. Studies set at earlier times in developing regions such as Taiwan (Arnold 1976) and Guatemala (Clark 1979) find no association between sibship size and educational attainment, while later studies of Thailand (Knodel, Havanon and Sittitrai 1990; Knodel and Wongsith 1991) and Taiwan (Hermalin, Seltzer and Lin 1982; Parrish and Willis 1990) show increasingly negative relationships among later cohorts compared to earlier ones.

Socio-economic developmental conditions in any society affect the availability and importance of education, and thereby the significance families accord to schooling. At earlier times,

schooling may not have been widely available; nor may opportunities for educated people have been abundant. The majority of families may not have regarded schooling as an important vehicle of socio-economic status or striven to allocate resources or regulate family size for this goal. Prosperous families, furthermore, might have found it possible to rear many children successfully and send them all to school. Thus, even though some schooling may have existed in the society, affected by factors such as family socio-economic status or urban residence, there may be no association, or even a positive one, between family size and children's education. Later, the importance of schooling for socio-economic achievement rises. As a result, families might initiate resource-distribution and family-planning processes with respect to schooling, and a negative relationship emerges (Mueller 1984).

This possibility is explicitly examined here by studying the family size-schooling associations in Peninsular Malaysia separately for two generations schooled in two different historical eras: the first before independence from colonial rule and educational and economic reforms, and the second after these events. During the colonial era the availability of education in Peninsular Malaysia was low, and it was of limited importance for socioeconomic opportunities. The inherently conservative colonial policies discouraged wide availability of secondary education in English or any local language, specifically to limit social mobility of individuals and to keep students content with their lot (Hirschman 1972; Inglis 1979). The colonial economy, organized around the subsistence agriculture, plantation and mining sectors, emphasized unskilled labour with few opportunities for advancement of educated people. Education was therefore not a critical aspect of human capital and was not greatly sought by most people.

After independence in 1957, education was greatly expanded from 1961 and the New Economic Policy emphasizing industrialization implemented from 1971, to develop rapidly the manufacturing sector and generate an educated workforce to fulfil labour needs. Malaysia is now a significant world centre for the assembly and export of manufactured goods, particularly electronics. Opportunities for educated people abound. From the 1980s Malaysia has been considered a 'lower middle income economy' (World Bank 1990); it is projected to join the ranks of industrialized nations by the first quarter of the 21st century, indicating the dramatic success of national policies.

These developments underscore the growing availability of education and its growing relevance for individual socio-economic advancement. Demand for schooling at increasingly high levels is rising. The Malaysian Federal Government is expanding educational facilities and greatly subsidizing costs. For example, between 1980 and 1986, annual education expenditures increased by 32 per cent to 5 billion Malaysian dollars (Rahaman 1992). The post-independence era also saw the onset of a demographic transition. The national family planning programme, begun in 1966, marked a mortality and fertility decline; the latter affected by rising age at marriage and limitation of marital fertility. In 1957 the Total Fertility of Malaysia was 6.8; by 1986 it had dropped to 3.7 (Peng, Ann, Chang and Kit 1988).

In the light of these marked changes in the developmental context in Peninsular Malaysia, this study examines how the family size-education relationship varies with changes in extra-familial conditions, and specifically whether a negative relationship will emerge only in the later era when education becomes a critical asset bringing important socio-economic rewards.

2B. ETHNICITY IN MALAYSIAN EDUCATION POLICIES

In Peninsular Malaysia, post-independence socioeconomic development was accompanied by state-sponsored affirmative action policies, particularly targeting the Malay ethnic group for educational subsidies and employment quotas. This study contrasts the family size-education association within the three main ethnic groups in the society – the Malays, the Chinese, and the Indians – across the two developmental eras, to examine whether education subsidies provided by the state can mitigate a negative family size-education relationship hitherto argued to arise from within-family resource distribution processes.

While in and out-migration of various groups has been a long-standing historical feature of South East Asia, the distinctive characteristics of multiethnic modern Malaysian society are rooted in colonial economic and social organization, which imported labour from East and South Asia, and encouraged occupational, geographic and socioeconomic segregation by ethnicity (Hirschman 1974). Ethnicity correlates with socio-economic characteristics, forms the basis of policies and political action, and separates the society along linguistic, cultural, and religious lines into largely endogamous sub-populations. The 1990 census showed that approximately 58 per cent of the Peninsular Malaysian population was of Malay ethnicity, 32 per cent Chinese, and 10 per cent South Asian.

The limited schooling facilities available during the colonial era described above were mainly organized by each ethnic community along linguistic lines. The largely rural and agrarian Malays received the least amount of schooling on average; the more urbanized Chinese were in the forefront. The Indian community, mostly working on the plantations, was provided with minimal schooling facilities for their children on the estates, and had an intermediate educational position (Klitgaard and Katz 1983).

The ethnic association with education, occupation and poverty resulting from colonial policies persisted after independence. The Malays, the numerical majority, were socio-economically the most depressed. The Chinese, the largest minority group, were the most prosperous. The 1969 ethnic riots in response to these inequities prompted the government to formulate the New Economic Policy of 1971, aimed at overall economic development, but specifically at eliminating the association of ethnicity with poverty and introducing assertive affirmative action to redress the situation of the Malays. The educational reforms begun in 1961 were accelerated, schooling facilities expanded, and English-medium schools consolidated into Malay-medium at all levels for government and national schools. While primary schooling is free, a high quota of government scholarships for secondary or higher education, places at tertiary level educational institutions, and government and private sector jobs are reserved for 'bumiputras' (ethnic Malays, literally 'sons of the soil'). Such benefits are less available for Chinese or Indians, and heighten a sense of economic constraint among them (Wang 1983; Selvaratnam 1988).

Driven by increasing economic opportunities, demand for education remains high and growing among all ethnic groups. Despite the government subsidy for education, many schooling expenses are borne by households. These costs are largely internalized to families among Chinese and Indians, while among the Malays, through means such as scholarships and quotas,

costs are substantially borne by the state and are thus external to families. The average annual amount spent by each household on children's education, increasing with succeeding levels of schooling, is highest among the Chinese, intermediate among Indians, and at least among the Malays (Rahaman 1992).

Some argue that provision of special educational privileges to the Malays enabled them to improve the education of their children while making fewer sacrifices, particularly that of limiting family size, than the Chinese or Indians (Govindasamy 1991). The fertility decline in Malaysia is also differentiated by ethnicity. In 1957, the Total Fertility of the Indians was highest (8.0), followed by that of the Chinese (7.1) and the Malays (6.1). In 1986, Malay fertility was the highest (4.7) followed by that of the Indians (3.0) and the Chinese (2.7). The changing relative position of the ethnic groups is noteworthy (Peng, Ann, Chan and Kit 1988).

The policy focus on ethnicity leads us to examine the family size – schooling relationship within each ethnic group at different stages of Malaysian developmental history. During the colonial era, when education was of limited importance for the overall society, there may not have been any association between family size and education in any ethnic group. We examine whether a negative association arose subsequently among the Chinese and Indians, who received fewer subsidies than did the Malays after the new education policies were implemented.

3. FAMILY SEX COMPOSITION AND EDUCATIONAL ATTAINMENT: WHO IS AT GREATER RISK?

Studies examining the impact of high fertility on children's well-being often consider whether certain children, specifically girls, bear excessively the detrimental consequences of larger family size. For example, when resources are scarce, the physical well-being of the more valued children in a family is often sought at the expense of the others, a phenomenon visible in patterns of boys' versus girls' survival rates in East and South Asia. When fertility is high, higher birth order girls are the most disadvantaged (Ben-Porath and Welch 1980; Chen et al. 1981; Miller 1981; Rosenzweig and Schultz 1982; Das Gupta 1987; Hull 1990; Johansson and Nygren 1991).

Birth order and sex are also said to affect educational attainment, further illustrating how intra-familial resource allocation targets different children within the same family. Studies describe how girls in some regions receive less schooling than do boys during rapid socio-economic development. Taiwan, Singapore, and Hong Kong exhibit the so-called 'East Asian' pattern of intrafamilial stratification, whereby earlier-born girls typically leave school earlier than their brothers and consequently enter lower rungs of the work force, because parents in these patriarchal and patrilineal cultures, anticipating the need for support in their old age, prefer their sons to advance educationally and their daughters to contribute to family finances before marrying (Salaff 1981; Greenhalgh 1985). Thus, increasing numbers of opposite-sex siblings are an educational threat for girls, while they are a benefit for boys. For boys the best schooling situation is to have older sisters, and for girls the worst is having younger brothers (Tang 1981).

Other studies in East Asia find, however, that higher birth order children, irrespective of sex, receive more education than their elder siblings, and assert that the level of resources available to a family is more important for child schooling than traditional ideas regarding sex roles. Since

higher birth order children are born when parents are relatively older and more advanced in their occupations, these children reap educational benefits from their parents' improved circumstances (Parrish and Willis 1990).

In Peninsular Malaysia girls generally receive less education than boys among all ethnic groups, owing to a persistent ideology that girls need less formal schooling since their sphere is primarily domestic. This is despite the comparatively high status and economic autonomy of women in traditional Malay society (Manderson 1979). The different socialization of the sexes, combined with perceived unequal returns to schooling for boys versus girls, has repercussions for post-secondary educational aspirations of male and female children and for their actual enrolment patterns (Wang 1980). At post-primary levels, household expenditure on boys' education is progressively greater than that on girls. In 1990, the sex ratio for postsecondary enrolment was 126 boys for every 100 girls (Rahaman 1992).

In the light of such evidence, this study enquires whether the schooling of girls in Peninsular Mayalsian society is more negatively affected by high fertility than that of boys, among the three ethnic groups experiencing the changing development and policy conditions described in the previous sections. It investigates the impact on educational attainment of increasing numbers of older and younger siblings of the same sex and opposite sex, for boys and girls. If earlier-born girls are at greater risk because sons are favoured, their education chances would be hurt by increasing numbers of younger brothers. Boys would benefit from having older sisters.

4. MATERIALS AND METHODS

The data used are from the 1976 and the 1988 Malaysian Family Life Surveys (MFLS 1 and 2) conducted jointly by RAND, the Government of Malaysia, and Survey Research Malaysia. The two longitudinal waves of the MFLS are used to generate two samples of individuals who represent the two generations exposed to the different historical, development and policy conditions described in Section 2. To incorporate explicitly the stage of societal development into the model, the analyses are conducted separately for two generations, which are (1) MFLS-1 respondents and their spouses (henceforward the 'older generation') and (2) a subgroup of MFLS-2 respondents and spouses (the 'younger generation'). This subgroup consists partly of children of the respondents of the older generation, and partly of an entirely new sample of young adults. The older generation mostly completed its schooling before independence and the economic and educational reforms, while most of the younger generation did so after these events. Both waves of the data measured respondents' years of educational attainment, number and birth order of brothers and sisters (yielding measures of family size and sex composition), and variables indicating family socio-economic status.

Older generation: sample adjustment and variable measurement

The 1976 MFLS-1 sample, from which the older generation is drawn, consists of 1,165 ever-married women aged 18-45 whose spouses were also interviewed. The sample was adjusted to exclude the youngest women who over-represent those who marry early and are thus likely to be less educated. The women's spouses were then added to the sample. Only those belonging to the three main ethnic groups were retained, resulting in a group of 2,114 individuals.

For each generation, two relevant levels of schooling are chosen for analysis. For the older generation, who did not have much schooling on average, the analysis of educational attainment first assesses the likelihood of an individual entering school, and second the completion of primary school among those who enter. For the first analysis, the dependent variable is given a value of 0 for those who never entered school; while those who have at least 1 year of schooling are given a value of 1. For the second analysis, those who never entered school are omitted from the sample. Those who received less than 6 years of school are coded 0 while those who completed at least 6 years (primary school) are coded 1.

Family size refers to the number of siblings a respondent had when aged 10, rather than to their report of the number of live births to their mother, since the latter measure is likely to be less reliable. This measure is used ordinally, and is also categorized in a separate analysis to contrast small families (1-3 children) with medium (4-5 children) and large ones (6 or more children). Family sex composition is given by numbers of older and younger sisters and brothers.

Younger generation: sample adjustment and variable measurement

In its complex sample design, the 1988 MFLS-2 survey included a 'panel' of respondents of the 1976 survey, and included two children of each ever-married women interviewed in 1976. A 'new' sample of women aged 18 and over irrespective of marital status was interviewed. Of these, spouses of married women were also interviewed. A 'senior' sample of individuals aged 50 and over was surveyed. In this study, the 'panel' and 'senior' samples are excluded; i.e. individuals from the 'children' and 'new' samples only are included. Of these, women under age 18 are dropped from this analysis. Those aged 40 and above are also excluded to avoid overlap with the older generation's educational experience. Only those of the three main ethnic groups are retained for this analysis. This results in a sample of 3,982 individuals.[1]

The younger generation in Peninsular Malaysia received much more education than did their parents. Almost no-one in recent years has never attended school. Therefore, analysis of educational attainment among the younger generation focuses on higher levels of schooling than among the older generation, specifically examining completion of socially significant levels of schooling such as primary and secondary education, conditional on their entering the level. The analysis of educational attainment first assesses the likelihood of completing primary school. Those who completed at least 6 years of schooling are coded 1; those who have less are coded 0. Second, among those who entered secondary school, the likelihood of completing this level is

[1] The "new' and 'senior' samples of the MFLS-2 purposively over-sampled Indians to ensure adequate numbers of this community for analysis. In contrast, Indians were only slightly over-represented In MFLS-1 (The Second Malaysian Family Life Survey Overview and Technical Report, Haaga et al., RAND 1993). Therefore, analysis intending to produce national-level parameters, using the new or senior samples of MFLS-2, are advised to use the sample weights provided to correct for the over-representation of Indians. My analysis here however did not use these weights, for two reasons. First, I was pooling data from the 'new' and the 'children' samples, while the sample weights are intended for the 'new' and 'senior' samples only. Second, the bulk of my analyses are run separately for each ethnic group, to illustrate contrasting patterns among them. Therefore, the over-representation of Indians does not affect my findings for the ethnic contrasts. The findings for the 'overall' group will be affected by the over-representation of Indians in terms of magnitude (for example average years of schooling would be slightly greater than my calculations show), but the substantive conclusions are not affected.

assessed. Those who never entered secondary school are omitted from the sample. Those who completed secondary school are coded 1 and the rest are coded 0. Numbers of siblings are measured by respondent's report of number of brothers and sisters living. Family sex composition is measured as for the older generation.

Methods

Multivariate logistic regression techniques, suitable for analysing dichotomous dependent variables, are used to model the impact of family size and sex composition variables on levels of educational attainment. This technique estimates the log of the odds of the outcome occurring, in terms of a vector of independent variables, and an error term, taking the general form:

$$\ln(Y) = a + b_1X_1 + b_2X_2 + \ \ldots\ b_nX_n$$

where ln (Y) represents the natural logarithm of the odds of the outcome; a = the intercept; and b_1, b_2 etc. are the coefficients associated with each predictor variable. The resulting coefficients can be interpreted for their significance and direction, and transformed through exponentation to yield odds ratios that indicate the magnitude of the variable's impact on the probability of the outcome occurring (Alba 1987). In this study, the odds ratios are presented only to indicate whether particular variables increase or lessen an individual's chance of completing the specified level of schooling, and not to highlight the exact magnitude of the impact. Odds ratios greater than 1 indicate an increased chance of the outcome occurring; those less than unity signify a decreased chance. Inferences regarding the precise magnitude of the effect are not attempted here.

To focus on the impact of family size and sex composition variables on educational attainment, the models control for family background characteristics that can influence educational attainment, namely parental education and occupation, rural/urban residence,[2] missing data, and individual's birth cohort, sex, and birth order. For the older generation, controls for missing parental data were included. For the younger generation this was unnecessary. For brevity, the results report the impact of family size and sex composition variables net of the controls.[3]

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[2] Since rural/urban residence was not explicitly ascertained in the residence histories of the older generation in MFLS-1, I am indebted to Baydar, White, Simkins and Babakol (1990) for their coding scheme, on which my classification is based.

[3] Since the aim of this study is to examine the impact of family demographic conditions on educational attainment net of parental socio-economic characteristics, the possibility of endogeneity of family size m these relationships must be considered. That is, the possibility that families jointly determine family size and child schooling outcomes must be considered and ruled out for the estimates in this study to be unbiased.

This possibility can be considered separately for each generation. First, it is unhkely that the parents of the older generation would have had the motivation deliberately to control family size with respect to child schooling, since at the time in question the fertility transition in this society was still far in the future, and education was of limited importance. While there may have been some impact on family size of traditional breastfeeding or abstinence practices, deliberate manipulation of family size with respect to desired child schooling would have been highly unlikely. Thus, I argue that it is improbable that family size and children's education were jointly determined at the outset of marriage by the parents of the older generation, and statistically correcting for this in the models estimated is unnecessary.

Among the younger generation, the possibility of the joint determination of family size and child schooling outcomes by parents might arise, particularly with the rising importance of education and the onset of the

To illustrate the relationships under changing development conditions, the models are run for each generation separately. To highlight the impact of affirmative action policy, each ethnic group is analysed separately. Finally, to investigate whether girls bear a greater impact than boys of high fertility, sex composition variables are analysed separately for each sex.

5. RESULTS: FAMILY SIZE AND EDUCATIONAL ATTAINMENT

Table 1 contrasts educational attainment of the older and younger generations, and the changing relative situation of the different ethnic groups. For the older generation, average schooling attainment is low, approximately 4.5 years overall, with the Chinese in the forefront, followed by the Indians, and the Malays with least. The sex gap in education, over two years overall, is greatest among the Chinese, less among the Indians, and least among the Malays. Total number of siblings of the respondent at age 10 is quite low, probably reflecting infant/child mortality, with little ethnic variation.

The effects of the development and education reform policies are strikingly apparent among the younger generation: they have nine years of schooling on average. The situation of the Malays has markedly improved; their attainment is now the greatest, followed by the Chinese, while Indians have the lowest attainment. The gender gap in education has dropped to one year overall, and is now least among the Chinese, and greatest among the Malays. Number of siblings is slightly greater than in the older generation (again probably due to higher infant/child mortality for the older generation) and there is still not much difference between ethnic groups.

The bivariate relationship between family size and educational attainment for the older generation among the overall groups shows a small positive and significant relationship according to the correlation coefficient (based on ungrouped measures). The chi-squared statistic however reveals no significant association. Among the Chinese, no significant association appears between family size and schooling, whether indicated by the chi-square statistic or the correlation coefficient. Among the Malays and Indians, a significant and positive correlation appears, but the chi-squared statistic is not significant.

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demographic transition. However, the sociological theories of resource dilution cited in this study argue that family size exercises an independent effect on child schooling outcomes irrespective of parental plans, in contrast to the economic theories which emphasize deliberate trade-offs jointly determining numbers and schooling of children. Instead of adopting one or other view, in this study I suggest that the reality might lie somewhere between the two positions : parents might plan number of children with regard to education and other expenses, but the outcomes of family size and of child schooling are not perfectly under their control. Further, studies in neighbouring developing regions such as Thailand and India find that parents both of large and of small families express similar educational aspirations for their children, which weakens the argument that they effectively weigh quantity versus quality of children at the outset of marriage (Knodel et al. 1990; Jejeebhoy 1992). Thus, this study does not present models correcting for endogeneity.

Additionally, corrections for endogeneity most often involve the use of an instrumental variable as a proxy for family size. The proceeding is fraught with its own drawbacks since an appropriate instrument is hard to find and, once chosen, is always open to criticism. Moreover, as Desai (1995) found, corrections for the situation often add 'noise' to the model while leaving the substantive conclusions unchanged. Thus, in this study I do not correct for endogeneity and results should be interpreted bearing this in mind.

Table 1. Strength of relationship between education and family size in each generation: overall and by ethnicity

Variable	Overall	Malay	Chinese	Indian
Older generation				
Mean number of siblings	3.9	3.7	4.4	3.6
Mean years of education				
Total	4.4	3.9	4.9	4.7
Male	5.5	4.8	6.1	5.9
Female	3.4	3.1	3.7	3.6
Bivariate association				
(1) Correlation (Pearson) between number of siblings and years of education	0.08***	0.09***	0.02	0.21***
(2) Association (chi-square) between family size category[a] and level of education	15.48	9.78	6.26	14.34
N	1,994	980	767	247
Younger generation				
Mean number of siblings	5.9	5.9	5.7	5.8
Mean years of education				
Total	8.9	9.4	8.8	8.1
Male	9.6	10.0	9.1	8.8
Female	8.6	8.9	8.6	7.6
Bivariate association				
(1) Correlation (Pearson) between number of siblings and years of education	–0.09***	–0.02	–0.23***	–0.19***
(2) Association (chi-square) between family size category[a] and level of education	30.60***	7.17	41.69***	32.46***
N	3,947	2,283	906	758

Source: Older generation: Malaysian Family Life Survey 1976. Younger Generation: Malaysian Family Life Survey 1988.

[a] Family size groups: small = 1-3 children; medium = 4-5 children; large = 6+ children.

Levels of education: no schooling, primary, lower secondary, upper secondary, Form VI and tertiary.

*** Significant at the 0.01 level; *** Significant at the 0.05 level; * Significant at the 0.10 level.

Among the younger generation, the correlation and chi-square statistics show a significant negative association between family size and schooling emerging among the overall population. Notably, this negative association does not hold for Malays, but only for Chinese and Indians. This change over generations provides initial support for the notion that a negative association between family size and educational attainment will emerge only at a later developmental phase when educated is of importance and people strive to school their children; and the ethnic differences indicate the impact on family-level relationships of state education subsidies.

Table 2 shows logistic regression coefficients and odds ratios of the effect of family size variables on the likelihood of entering school, and of completing primary school, net of the control variables, for individuals of the older generation. No significant impact is observed of family size whether measured continuously or in categories, net of the controls. The coefficients of the control variables, not presented here, show that educational attainment in this generation is significantly affected by ethnicity, parental socio-economic status, place of residence, sex, and birth cohort.

Table 2. Maximum likelihood estimates and associated odds ratios of the effect of family size variables on the log odds of an individual entering school (ES) and completing primary school (CP),[a] net of control variables;[b] older generation, by ethnicity

	Malay		Chinese		Indian	
Predictor	**ES**	**CP**	**ES**	**CP**	**ES**	**CP**
Model I						
Total siblings	–0.002	0.06	–0.04	–0.002	0.03	0.03
(Odds ratios)	(0.99)	(1.06)	(0.96)	(0.99)	(0.98)	(1.03)
L.R. χ^2	307.5	160.7	183.8	121.5	51.1	44.5
D.F.	16	16	16	16	16	16
Model II						
Medium families[c]						
(4–5 children)	0.05	0.01	0.06	0.43*	–0.32	–0.31
(Odds Ratios)	(1.05)	(1.01)	(1.06)	(1.54)	(0.73)	(0.73)
Large families						
(6+ children)	–0.11	0.36	–0.14	–0.15	0.06	0.20
(Odds Ratios)	(0.90)	(1.43)	(0.87)	(0.86)	(1.06)	(1.22)
L.R. χ^2	307.9	161.3	182.8	128.5	51.3	45.5
D.F.	17	17	17	17	17	17
Maximum *N*	977	701	766	591	250	188

Source: Malaysian Family Life Survey 1976.

[a] Conditional on entering previous level.

[b] Models control for gender, birth cohort, birth order, parental education and occupation, missing data, and region of residence.

[c] Reference category is 'Small Families' (1-3 children).

*** Significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.10 level.

Table 3. Maximum likelihood estimates and associated odds ratios of the effect of family size variables on the log odds of an individual completing (CP) and secondary school (CS),[a] net of control variables;[b] younger generation, by ethnicity

	Malay		Chinese		Indian	
Predictor	**ES**	**CP**	**ES**	**CP**	**ES**	**CP**
Model II						
Total siblings	0.01	–0.02	–0.14***	0.03	–0.07*	0.04
(Odds ratios)	(1.01)	(0.98)	(0.87)	(1.03)	(0.93)	(1.04)
L.R. χ^2	166.5	82.5	76.7	51.6	94.5	80.9
D.F.	12	12	12	12	12	12
Model III						
Medium families[c]						
(4–5 children)	–0.16	–0.09	–0.02	–0.10	–0.52	–0.53
(Odds Ratios)	(0.85)	(0.91)	(0.98)	(0.90)	(0.59)	(0.59)
Large families						
(6+ children)	0.08	–0.10	–0.74*	0.42	–0.81*	–0.43
(Odds Ratios)	(1.08)	(0.90)	(0.48)	(1.52)	(0.44)	(0.65)
L.R. χ^2	168.2	82.5	72.9	58.4	94.5	82.0
D.F.	13	13	13	13	13	13
Maximum *N*	2,179	1,531	878	526	708	436

Source: Malaysian Family Life Survey 1986.

Maximum likelihood estimates show the effect of the variable on the log odds of entering the level of schooling.

[a] Conditional on entering previous level.

[b] Models control for gender, birth cohort, birth order, parental education and occupation, and region of residence.

[c] Reference category is "Small Families (1 3 children).

*** Significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.10 level.

The lack of a family size-schooling relationship in this generation, despite a pattern of other systematic socio-economic determinants of education, is consistent with the argument that such a relationship is likely to be absent at earlier stages of development when the importance of education is low, and the motivation for families to control fertility or allocate resources with respect to child schooling is lacking. This description fits Malaysia before independence.

Table 3 presents results for the impact of family size variables on the likelihood of individuals in the younger generation completing primary and secondary school, net of the variables controlling for family background. Remarkably, among the Malays, there is no effect of family size, measured in any way, on any level of education. Among the Chinese and Indians, who did not reap as many educational subsidy benefits under the new policy regimes, there emerges a significant net negative effect of family size on the chances of completing primary school, but not of secondary school. The schooling disadvantages among these ethnic groups deriving from increasing family size are felt earlier in the educational path. Those who succeed in advancing to higher levels appear more affected by other factors, including ethnicity, sex, and parental socio-economic status (separate analyses not presented here).

These findings are consistent with the arguments that the detrimental effects of family size on children's education will emerge only when developmental conditions increase the importance of educational attainment, and will not do so among those groups for whom educational opportunities are buttressed by government subsidies and for whom intra-familial resource constraints are consequently lower (as among Malays contrasted with Chinese or Indians in post-reform Malaysia). The development and policy situation in post-independence Malaysia greatly internalized the costs of education to families among Chinese and Indians, while demand for education remained high among them. The fact that family size does not appear important at higher levels of education is consistent with previous studies which found that children were most vulnerable to the deleterious effects of resource dilution early in their schooling career (Blake 1989).

6. SEX COMPOSITION AND EDUCATIONAL ATTAINMENT

To investigate whether certain offspring in families, such as earlier-born girls, are disproportionately disadvantaged by high fertility, we examine the impact of increasing numbers of older and younger, same and opposite-sex siblings on the likelihood of educational attainment of boys and gifts in each generation. Analyses not presented here show that sex is a significant predictor of education chances. For the older generation, boys are five times more likely to enter school than girls, and about 1.75 times as likely to complete primary school if they enter it. Among the younger generation, though, girls are only about 0.41 as likely as boys to complete primary school; once they enter secondary school they appear statistically equally likely to complete that level.

Table 4 presents logistic regression coefficients and odds ratios for the impact of additional older and younger brothers and sisters on the chance of entering school and completing primary education, for boys and girls of the older generation. We see significant effects mainly among the Chinese group, where increasing numbers of older sisters benefit boys' chances of completing primary school. Girls are negatively affected by having more younger sisters.

Table 4. Maximum likelihood estimates and associated odds ratios of sex composition in the older generation entering school (ES) and completing primary school (CP),[a] net variables on the log odds of boys versus girls of control variables[b]

	Malay		Chinese		Indian	
Predictor	**ES**	**CP**	**ES**	**CP**	**ES**	**CP**
For boys						
Older brothers (*N*)	–0.13	–0.07	0.06	0.08	–0.27	0.21
(Odds ratios)	(0.88)	(0.93)	(1.06)	(1.08)	(0.76)	(1.23)
Older sisters (*N*)	0.24	0.12	0.13	0.18*	0.60	0.30
(Odds ratios)	(1.27)	(1.13)	(1.14)	(1.19)	(1.82)	(1.35)
Younger brothers (*N*)	0.13	–0.10	–0.18	0.08	–0.47	0.04
(Odds ratios)	(1.14)	(0.90)	(0.83)	(1.08)	(0.63)	(1.04)
Younger sisters (*N*)	–0.03	0.02	–0.07	–0.01	0.51	–0.18
(Odds ratios)	(0.97)	(1.02)	(0.93)	(0.99)	(1.66)	(0.83)
L.R. χ^2	66.1	102.8	50.7	79.5	29.4	29.4
D.F.	17	17	17	17	17	17
N	454	388	344	314	120	105
For girls						
Older brothers (*N*)	0.002	0.02	–0.04	–0.13	0.11	0.18
(Odds ratios)	(1.00)	(1.02)	(0.96)	(0.88)	(1.12)	(1.19)
Older sisters (*N*)	0.07	0.18	0.15	–0.03	–0.02	–0.24
(Odds ratios)	(1.07)	(1.19)	(1.16)	(0.97)	(0.98)	(0.79)
Younger brothers (*N*)	–0.11	0.10	–0.15	–0.02	0.07	0.31
(Odds ratios)	(0.89)	(1.11)	(0.86)	(0.98)	(1.07)	(1.36)
Younger sisters (*N*)	0.004	0.27	0.06	–0.29**	–0.11	–0.31
(Odds ratios)	(1.00)	(1.31)	(1.06)	(0.75)	(0.89)	(0.73)
L.R. χ^2	184.1	74.0	84.6	61.4	22.7	31.5
D.F.	17	17	17	17	17	17
N	525	314	415	277	130	83

Source: Malaysian Family Life Survey 1976.

[a] Conditional on entering previous level.

[b] Models control for parental education and occupation, missing data, region of residence, and individual's birth cohort.

*** Significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.10 level.

Among the younger generation, again the strongest effects appear among the Chinese (Table 5). However, it is not Chinese girls alone who appear to feel the impact of increasing numbers of siblings. Chinese boys are negatively affected by older and younger brothers, and appear benefited by having older sisters. Chinese girls' education chances are hurt by younger sisters as well as brothers. Among Indian boys, older brothers help chances of completing lower secondary school. Indian girls' chances are hurt by more younger brothers. Among Malays there is little impact; unsurprisingly, since there was no impact of family size variables among them.

Thus, while sex is a strong delimiter of schooling opportunity among both generations, and increasing family size has a negative impact on education among the younger generation, the effects do not appear concentrated only among girls. Though Chinese girls appear educationally disadvantaged by increased numbers of younger siblings, the classic 'East Asian' pattern of within-family educational stratification (where younger boys, not younger girls, benefit from their elder sisters, and earlier born girls drop out of school specifically to benefit their younger brothers) does not appear to be operating in Malaysia. This is so even among the Chinese,

especially since Chinese boys also appear to be competing with their brothers for educational resources, though their elder sisters present an educational advantage for them.

Table 5. Maximum likelihood estimates and associated odds ratios of sex composition variables on the log odds of boys versus girls in the younger generation completing primary school (CP) and secondary school (CS),[a] net of control variables[b]

	Malay		Chinese		Indian	
Predictor	**ES**	**CP**	**ES**	**CP**	**ES**	**CP**
For boys						
Older brothers (*N*)	–0.01	0.02	–0.38***	–0.09	–0.11	0.37***
(Odds ratios)	(0.99)	(1.02)	(0.68)	(0.91)	(0.89)	(1.45)
Older sisters (*N*)	0.12	0.04	0.51***	0.13	0.19	–0.07
(Odds ratios)	(1.13)	(1.04)	(1.66)	(1.14)	(1.21)	(0.93)
Younger brothers (*N*)	–0.03	–0.05	–0.26*	0.08	–0.09	0.02
(Odds ratios)	(0.97)	(0.95)	(0.77)	(1.08)	(0.91)	(1.02)
Younger sisters (*N*)	–0.02	0.02	–0.07	0.21	–0.05	0.07
(Odds ratios)	(0.98)	(1.02)	(0.93)	(1.23)	(0.95)	(1.07)
L.R. χ^2	47.4	39.3	18.4	37.7	18.9	55.6
D.F.	14	14	14	14	14	14
N	900	679	339	216	285	193
For girls						
Older brothers (*N*)	0.08	0.11*	0.12	–0.04	0.002	0.13
(Odds ratios)	(1.08)	(1.12)	(1.13)	(0.96)	(1.00)	(1.14)
Older sisters (*N*)	0.15	–0.03	0.01	0.19*	–0.05	0.04
(Odds ratios)	(1.16)	(0.97)	(1.01)	(1.21)	(0.95)	(1.04)
Younger brothers (*N*)	–0.01	–0.08	–0.33***	–0.14	–0.12	–0.26**
(Odds ratios)	(0.99)	(0.92)	(0.71)	(0.87)	(0.89)	(0.77)
Younger sisters (*N*)	–0.06	–0.06	–0.28***	–0.03	–0.09	–0.05
(Odds ratios)	(0.94)	(0.94)	(0.76)	(0.97)	(0.91)	(0.95)
L.R. χ^2	120.8	65.4	105.7	37.3	79.5	48.8
D.F.	14	14	14	14	14	14
N	1,277	850	536	308	423	243

Source: Malaysian Family Life Survey 1988.

[a] Conditional on entering previous level.

[b] Overall models control for parental education and occupation, ethnicity, region of residence, and individual's birth cohort. Models for each ethnic group control for all of these except ethnicity.

*** Significant at the 0.01 level: ** significant at the 0.05 level; * significant at the 0.10 level.

7. DISCUSSION

These results underscore the argument that analyses of the impact of high fertility on children's wellbeing, particularly their education, should take into account how conditions external to the family affect the relationship. Earlier approaches, which only considered resource dilution processes operating at the level of the family and ignored the role of extra-familial contexts and institutions, were unable to predict or account for diverse associations worldwide.

I argue in general that studies examining the impact of high fertility on the well-being of children must not view families as isolated entities within an overall society, but should take into account the significant social groupings to which families belong. This is highlighted when we consider that, had I confined my analysis to examining the 'overall' group of individuals of both generations, I might have concluded that the negative family size-schooling relationship

emerging among the younger generation affects all Malaysians. However, considering the family as being embedded within a network of social groups and relationships (ethnicity in this case) led to a consideration of other extra-familial factors (state affirmative action policy in this case) and to modified conclusions. As argued elsewhere (Clark and Shreeniwas 1994), most studies examining the impact of family-level factors on children's well-being focus on individual families. They ignore the wider groups to which families belong, which condition their behaviour and which indicate social causation of fertility and well-being. This often leads to difficult policy recommendations that are either too specific, targeting all children of high birth order or short birth interval, or too general, aimed at reducing fertility in the entire society. A consideration of the relationships among significant socio-economic groups to which families belong might focus policies more effectively.

The contrast examined here between development and policy conditions of Peninsular Malaysia before and after independence from colonial rule illustrates the importance of two contextual dimensions for the family size-education relationship. First, the increasing significance of education as development proceeds, and second, the government policy of subsidizing education which mitigates intra-familial resource dilution. A negative association between family size and children's education arose in Peninsular Malaysia only at a later stage of development when education became an important asset, and families strove to ensure that their children were schooled. However, affirmative action policies subsidizing education costs for the Malay ethnic group erased the detrimental impact of high fertility on child schooling among them, whereas among Chinese and Indians, the negative association is evident.

As well as pointing to the importance of developmental conditions, such findings indicate that governments play a critical role in mitigating family-level processes affecting child well-being, by making resources available from outside the family and influencing family-level decisions regarding outcomes such as education. In an era when governments worldwide faced with budget constraints are increasingly scaling back social welfare programmes, and relying more on families to ensure the well-being of children, such results are a reminder of the crucial role played by powerful extra-familial institutions. The negative family size-education association among those ethnic groups not receiving schooling subsidies show that individual families unaided might not be the best guarantors of children's well-being.

However, overcoming the educational disadvantage of high fertility through schooling subsidies may prove an expensive policy option. After 1984, arguing that the nation was underpopulated, the Malaysian government adopted a pro-natalist stance, aiming for a target population of 70 million by the year 2100. Subsequently, the fertility decline in this nation almost halted, especially among Malays (Peng, Ann, Chang and Kit 1988), though scholars argue about whether fluctuations in demographic trends in Peninsular Malaysia are due to population policy, or to other factors such as rising women's age at marriage following on expanding education and occupation opportunities, or the resurgence of fundamentalist Islam with conservative views on birth control and women's roles (DaVanzo and Haaga 1981 ; Hirschman 1986; Leete 1989). Some suggest that affirmative action policies played a role in arresting the fertility decline among Malays, particularly since in neighbouring Singapore, an industrialized society populated by the same ethnic groups as Malaysia but without analogous subsidy policies, fertility among all groups declined below the Malaysian levels (Jones 1990). As the Malaysian government

continues with a pro-natalist policy, albeit a mild one, the point is noteworthy that high fertility can impede its goal of developing a well-educated and competitive work force unless ever-increasing amounts are spent on schooling subsidies.

Regarding the role of high fertility in educational sex inequalities, though across time girls of all ethnic groups receive less education on average than boys, this study does not indicate that girls alone bear the brunt of the disadvantages of increasing family size. Among Malays there is no impact of high fertility on education among boys or girls. Among Chinese, earlier born girls in the younger generation appear disadvantaged by increasing numbers of younger siblings of both sexes, but boys also appear to compete with their brothers for educational resources. Among Indians no conclusive patterns emerge. Scholars analysing the educational roots of sex stratification in Peninsular Malaysia might not find high fertility and consequent educational resource dilution to be important causal mechanisms. More important factors might be movement of girls into less prestigious education streams and consequently into occupations with lower pay and status, as Brinton (1988) found for Japan.

AUTHOR NOTE

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